

**Abstract**

A Sigma-Delta Analog-to-Digital Converter (ADC) having efficient dithering that removes the idle channel tones of the sigma-delta converter is disclosed herein. These idle channel tones are reduced or removed by stretching the threshold window of multi-level quantizer. A dithering sequence is added by stretching the thresholds window randomly. The randomly stretched window destructs the periodicity of sigma-delta ADC modulator's output sequence and, thus, removes the idle channel tones. Compared with conventional methods, the Sigma-Delta ADC in accordance with the present invention has less SNR penalty and is simple to implement. Moreover, the sigma-delta ADC in accordance with the present invention has a higher allowed input dynamic range and higher signal-to-noise-plus-distortion-ratio (SNDR) than conventional modulator dithering schemes.